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MACHINES THAT INTERACT WITH MEN: to teach, test, and help to do a job
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MACHINES THAT INTERACT WITH MEN

to teach, test, and help to do a job

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System Research Limited

*Summary of a talk given at Aslib Winter meeting
London, 21st January 1963*

THE teaching machine is both an instrument and a natural development of activities pursued in experimental psychology. Whilst the earliest machine was devised by S. L. Pressey in 1920, none was developed for teaching purposes until the late 1940s when Professor Skinner of Harvard University realized the potentials of these machines in 'programmed' learning.

In the learning process the individual acquires knowledge in stages. If the steps in this process are small and closely inter-related then the learning process becomes relatively quick and easy. Certain subjects lend themselves to this technique and linear programmes can be devised whereby questions can be asked at each stage which lead the student to the correct solution. Such programmes can be operated using very simple equipment including books. Machines, however, have an advantage since they give more control over learning. As the material can be presented on microfilm and the machine requires only simple press-button technique, the equipment can be cheap (as low as £55) and in addition it can be used for a number of different programmes.

Since man has a finite rate of learning, the automated teaching method must of necessity vary in complexity and intelligibility. His rate of learning will depend upon a number of factors including his ability to memorize and his understanding of the words used, particularly in their context. To learn fully he must actively participate and be challenged at each stage. This requires a programme which allows students to progress according to their ability, back-tracking to earlier stages or relaxing the pace and the level of difficulty whenever it becomes clear that a step has not been fully understood.

This technique requires branching programmes and more sophisticated machinery. These more sophisticated machines can learn from the mistakes made by the student and adapt themselves to assist his learning process or even the manual skill he is being taught. Simple examples of such machines are those designed to teach the keyboard operation of punch card machines, or quicker reading. An example is the so-called Self-organizing Automatic Keyboard Instructor (SAKI) where the pupil operates a normal keyboard according to a series of instruction cards. To facilitate his keyboard exercises the keys light up on a cue display as well as the exercise card. As his speed and accuracy increase the machine adapts itself to his ability, speeding up or slowing down where necessary, providing less and less visual assistance until he accomplishes the skill required. A quicker reading machine has the same ability to adapt itself to the ability of the pupil. This is achieved when the pupil presses a button

opposite the correct answer to questions testing his comprehension of the passages which have been illuminated in sections for him to read. The machine can react by illuminating variable lengths, passages at faster or slower speeds.

The combination of machine and pupil becomes a self-organizing system in these advanced adaptive machines. The machine can constantly challenge the pupil and yet, whilst providing the student with a sense of achievement, can alter its challenge to suit the ability of the student to ensure there is no sense of failure.

Experimental adaptive machines have now been devised which can study group behaviour. One such machine can measure the performance of each individual and assess the ability of the group to act as a team. It is clear from progress already made that it will be possible to create a machine able to assist an individual to clarify his problem and so feed him with the information he may need—a mechanical reader's adviser. Whilst at present such machines are expensive to design and produce there is no reason to doubt that they will become an economic proposition.

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1. Warren M. Brodey, Nilo Lindgren. 1968. Human enhancement: Beyond the machine age. *IEEE Spectrum* 5:2, 79-93. [[CrossRef](#)]